|| ISSN(online): 2589-8698 || ISSN(print): 2589-868X ||

Available online on http://www.ijmbs.info

International Journal of Medical and Biomedical Studies; 2024; 8(3); 52-64

Original Research Article

Characteristics of Bacterial Patterns and Antibiotic Sensitivity in Patients with Odontogenic Cervical *Necrotizing Fasciitis*

Taufiq Julian Davit[1], Melita Sylvyana[2], Harmas Yazid Yusuf[1]

[1]Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Universitas Padjadjaran

[2]Department of Oral and Maxillofacial Surgery, Hasan Sadikin General Hospital Bandung, Indonesia, 40132

Received: 18-04-2024 / Revised 20-05-2024 / Accepted 10-06-2024
Corresponding author: Taufiq Julian Davit (taufiq20001@mail.unpad.ac.id)
DOI: **https://doi.org/10.32553/ijmbs.v8i3.2798**
Conflict of interest: Nil

Abstract:
Necrotizing fasciitis is an aggressive infection that influences superficial fascia and damages the overlying soft tissue. The infection usually happens in the fascia of the body and extremities; however, this condition can also happen in the maxillofacial area. This infection usually occurs in patients with chronic conditions, such as patients with diabetes mellitus or patients with blood vessel disease.

Introduction

Throughout history, millions of people reported died as a result of bacterial infection. This condition can be infectious from one person to another or from animal to human. Generally, infection is caused by bacteria, fungi, viruses, and parasites.[1] In developing countries, the number of deaths caused by infection has reached 39.5 million cases, and more than 25% are caused by parasites and infectious diseases.[2] Patient safety in a hospital is a service system that provides patient care to become safer. A critical patient is a patient with a life-threatening condition, that involves one or more disorders of vital organ systems. Without adequate intervention, this condition will worsen the patient's general health, causing permanent organ damage, and even death in hours to a few days.[3]

Infectious disease is a type of disease caused by germs, this condition usually happens in a tropical area like Indonesia. Some of the diseases are classified as endemic, and to treat this disease, antibiotics are used.[4] The prevalence of this infectious disease does not yet show a degression from year to year—various causative factors of infection include poor nutritional intake, lack of sanitation, and antibiotic resistance. Repeated use of antibiotics on several bacterial strains can cause a resistance condition.[5]

About 30% of infection incidents in the United States came from the hospital (nosocomial infection). The gram-negative bacteria that commonly cause the infection are *P. aeruginos*, *Acinetobacter baumanni*, *Enterobacteria*-ESBL *(*Extended Spectrum Beta Lactamase) producing or C*arbapenemase* and *Escherichia coli*. In Indonesia, the gram-negative bacteria that cause

hospital-related infections tend to be resistant to antibiotics that is used.[6]

The other frequent pathogens that cause a higher incidence of nosocomial infection is *Staphylococcus aureus*. Pathogens related to toxic shock syndrome are usually consequences of food poisoning, endocarditis, pneumonia, osteomyelitis, sepsis, arthritis, and encephalitis.[7] *S. aureus* is responsible for over 80% of suppurative diseases, with superficial skin as its natural habitat until we found some antibiotics to treat the disease, to prevent death, and also to improve continuity of human life.[8]

Most antibiotic usage occurs at the hospital, however, not all hospitals have regulations for supervising germ resistance, infection control, and monitoring antibiotic usage, making new guidelines in sustainable ways for antibiotic usage and prophylaxis as well as monitoring resistance patterns with laboratory test data so it can be used to discover potent antibiotics, that safe and effective.[9] A hospital should always take a record of sensitivity patterns with sensitivity test laboratory data so it can be used as a guideline for antibiotic usage.[4]

Patients in the emergency unit with submandibular abscess cases caused by odontogenic infection, is a patients who need appropriate action and handling as well as adequate antibiotics. In Indonesia, antibiotic therapy for bacterial infection disease was usually done based on empirical experience in the past or from international journal recommendations. This matter cannot justified because the bacterial pattern of the disease and its resistance pattern to antibiotics is different between one area with other regions, and also different from time to time. Irrational antibiotic usage can trigger bacterial resistance.[10] Empirical antibiotics usage was almost done to all of the patients. Empirical antibiotics administration was done based on bacterial pattern, and bacterial resistance was based on departmental units. Most of the germs and resistance patterns are reported in various journals from the number of cases at the hospital. Therefore, the objective of this study is to analyze the germs and resistance pattern in submandibular abscess patients resulting from odontogenic infection in Hasan Sadikin Hospital emergency unit.

Based on the background above, the main theme of this research is, an infection that originates from odontogenic is an infection that can cause abscess formation and can worsen to become a cervical necrotizing fasciitis condition, so that the treatment choice for emergency patients with cervical necrotizing fasciitis is necrotic debridement and antibiotics therapy administration with a precise empirical target, and this can be achieved from germs pattern data collection and antibiotics sensitivity testing in patients cervical necrotizing fasciitis, so this study was done with collecting germ culture data and sensitivity tests resulting from odontogenic infection from January 2020 – December 2022 period as consideration for empirical antibiotics therapy selection based on antibiotic sensitivity pattern to bacterial culture results as well as prognosis in maxillofacial surgery patient at the emergency unit at Hasan Sadikin Hospital, Bandung.

Methods

This study is an observational descriptive study with a retrospective approach using bacteria culture and resistance data as well as recorded data from patient's medical record. The study variables that is used in study is 1) Bacteria culture result; 2) Antibiotics sensitivity types; 3) Gram positive and negative bacteria; 4) Aerobes and anaerobes bacteria.

This study was done with method as following:

1) Collect oral and maxillofacial surgery patient data at Hasan Sadikin Hospital with painful cervical necrotizing fasciitis caused by odontogenic infection from January 2020 – December 2022 via oral and maxillofacial surgery patient at the emergency unit at Hasan Sadikin Hospital, Bandung.

2) Submit the medical record borrowing application who have been recorded to the medical record officer at Hasan Sadikin General Hospital, Bandung.

3) Identify the patient's cervical necrotizing fasciitis diagnosis according to recorded data.

4) Filling form by the researcher according to the instructions format

5) The data that has been collected through medical records is then recapitulated in

Microsoft Excel format.

6) Data processing, data analysis, and discussion

Materials

The target population in this research is all bacterial culture lab results from oral and maxillofacial surgery patient in emergency unit that experienced cervical necrotizing fasciitis resulting from odontogenic infection from January 2020 – December 2020 which meets the inclusion and exclusion criteria.

As for the criteria of this study, namely:

1) Inclusion criteria

Medical record and bacterial culture results from oral and maxillofacial surgery patient in emergency unit ata Hasan Sadikin Hospital that experienced cervical necrotizing fasciitis resulting from odontogenic infection from January 2020 – December 2022

2) Exclusion criteria

Medical record from patient with cervical necrotizing fasciitis which is not caused by odontogenic infection and not be equipped with bacterial culture results

Results

This descriptive observational study was carried out at Dr.Hasan Sadikin Hospital Bandung to all diagnosed patients with cervical necrotizing fasciitis from January 2020 until December 2020. Number of patient data and cultures obtained is 28 subjects. The research results are presented including culture characteristics, and microbes resistance test data to several antibiotics were examined.

Patient Characteristics

Table 1 explains characteristics of sample that diagnosed with cervical necrotizing fasciitis from January 2020 until December 2020 based on type of gender, average age as well as there is or not growth microbes based on culture.

Table 1: Characteristics of patient

Variable	N = 28
Age	46.21± 1 8, 82
Sex	
Man	21 (75%)
Woman	7 (25%)
Culture growth	21 (75%)

Germ and Resistance Patterns on The Cervical Necrotizing Fasciitis

Table 2 explains the distribution or pattern of germs found based on culture results in patients with cervical necrotizing fasciitis. The most common germs found to cause cervical *necrotizing fasciitis* at Hasan Sadikin General Hospital is Pseudomonaeruginosaosa (20.6%0 and followed by *Klebsiella pneumonia* (17.2%).

Table 2: Germs pattern percentage on the cervical necrotizing fasciitis

Sr. No.	Culture results	N (%)
Gram negative		
1	*Pseudomonas aeruginosa*	6 (20.6)
2	*Klebsiella pneumoniae*	5 (17.2)
3	*Acinetobacter baumannii*	4 (13.7)
4	*Enterobacter cloacae*	2 (6.8)
5	*Burkholderia cepacia*	2 (6.8)
6	*Achromobacter xylosoxidans*	2 (6.8)
7	*Stenotrophomonas maltophilia*	1 (3,4)
8	*Escherichia coli*	1 (3,4)
Gram-positive		
1	*S. pneumoniae*	4 (13.7)
2	*Staphylococcus aureus*	1 (3,4)
3	*Staphylococcus hominis*	1 (3,4)
4	*Streptococcus Sanguinis*	1 (3,4)

Table 3 explains the results of antibiotic sensitivity and resistance tests on the germs found based on culture results in patients with cervical necrotizing fasciitis. The table presented sorted based on higher percentage, that is *Pseudomonas Aeruginosa, Klebsiella Pneumonia, S. Pneumonia, and Acinetobacter Baumannii*

Table 3: Antibiotics Sensitivity Test from *Pseudomonas Aeruginosa* (n=6)

Sr. No.	Antibiotic name	Sensitive	Intermediate	Resistant
1	Ampicillin sulbactam	16.6%	-	83.4%
2	Cefotixin screen	-	-	83.4%
3	Ceftriaxone	-	16.6%	83.4%
4	Gentamicin	33.3%	-	66.7%
5	Amoxicillin-clavulanic	-	-	100%
6	Tazobactam	83.4%	16.6%	-
7	Cephalothin	-	-	100%
8	Cefazolin	-	-	100%
9	Cefuroxime	-	-	100%
10	Cefoperazone	-	-	100%
11	Cefotaxime	-	-	100%
12	Ceftazidime	83.4%	-	16.6%
13	Cefepime	33.3%	-	66.7%
14	Ciprofloxacin	33.3%	-	66.7%
15	Levofloxacin	-	-	100%
16	Moxifloxacin	-	-	100%
17	Azithreonam	66.7%	33.3%	
18	Tigercycline	66.7%	-	33.3%
19	Vancomycin	-	-	100%
20	Clindamycin	-	-	100%
21	Erythromycin	-	-	100%
22	Meropenem	83.4%	-	16.6%

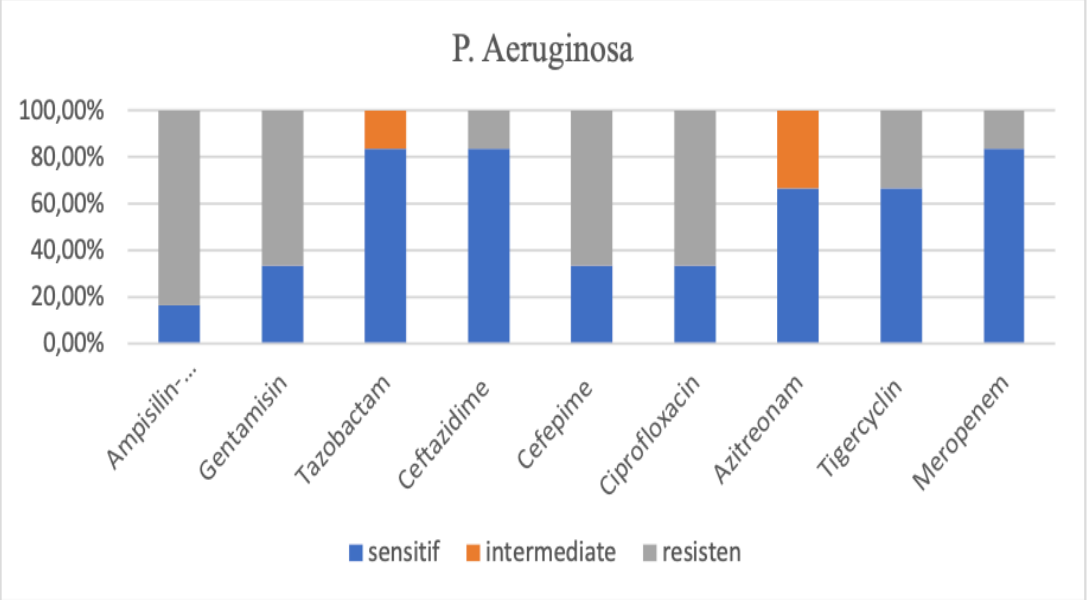

Figure 1P: Aeruginosa sensitivity results

Antibiotic sensitivity test results used in *Pseudomonas Aeruginosa* culture obtained that 83.4% of cultures (5 of 6 cultures) were sensitive to tazobactam and meropenem and 66.7% (4 of 6 cultures) were sensitive to tigercyclin and azitreonam.

Table 4: Antibiotics Sensitivity Test from *Klebsiella Pneumonia* (n=5)

Sr. No.	Antibiotic name	Sensitive	Intermediate	Resistant
1	Ampicillin sulbactam	20%	20%	60%
2	Cefotixin screen	-	-	100%
3	Ceftriaxone	20%	-	80%
4	Gentamicin	20%	20%	60%
5	Amoxicillin-clavulanic	-	20%	80%
6	Tazobactam	60%	20%	20%
7	Cephalothin	-	-	100%
8	Cefazolin	-	-	100%
9	Cefuroxime	20%	20%	60%
10	Cefoperazone	-	-	80%
11	Cefotaxime	20%	-	80%
12	Ceftazidime	20%	-	80%
13	Cefepime	20%	-	80%
14	Ciprofloxacin	20%	-	100%
15	Levofloxacin	-	-	100%
16	Moxifloxacin	-	-	100%
17	Azithreonam	20%	-	80%
18	Tigercycline	80%	-	20%
19	Vancomycin	-	-	100%
20	Clindamycin	-	-	100%
21	Erythromycin	-	-	100%
22	Meropenem	80%	-	20%

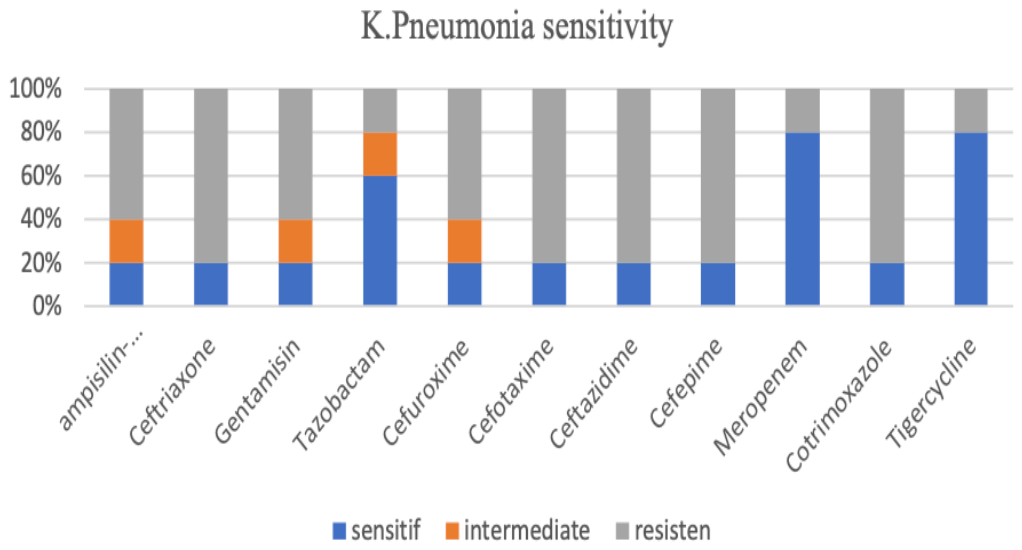

Figure 2: Sensitivity results *K. Pneumonia*

Antibiotic sensitivity test results that used in *Klebsiella Pneumonia* culture were obtained that 80% of cultures (4 of 5 cultures) were sensitive to tigercyclin and meropenem and 60% (3 of 5 cultures) were sensitive against tazobactam.

Table 5 Antibiotics Sensitivity Test from *S Pneumonia* (n=4)

Sr. No.	Antibiotic name	Sensitive	Intermediate	Resistant
1	Ampicillin sulbactam	25%	-	75%
2	Cefotixin screen	-	-	100%
3	Ceftriaxone	-	25%	75%
4	Gentamicin	25%	-	75%
5	Amoxicillin-clavulanic	-	-	100%
6	Tazobactam	25%	-	75%
7	Cephalothin	-	-	75%
8	Cefazolin	-	-	100%
9	Cefuroxime	-	-	100%
10	Cefoperazone	-	-	100%
11	Cefotaxime	-	-	100%
12	Ceftazidime	25%	-	75%
13	Cefepime	25%	-	75%
14	Ciprofloxacin	25%	-	75%
15	Levofloxacin	-	-	100%
16	Moxifloxacin	-	-	100%
17	Azithreonam	25%	-	75%
18	Tigercycline	75%	-	25%
19	Vancomycin	-	-	100%
20	Clindamycin	-	-	100%
21	Erythromycin	-	-	100%
22	Meropenem	75%	-	25%

Antibiotic sensitivity test results used in *S. Pneumonia* culture were obtained that the culture was 100% (4 of 4 cultures) sensitive to tigercyclin and 75% (3 of 4 cultures) were sensitive against meropenem. As many as 50% (2 of 4 cultures) results showed are sensitive to tazobactam, cefoperazone, and cefepime.

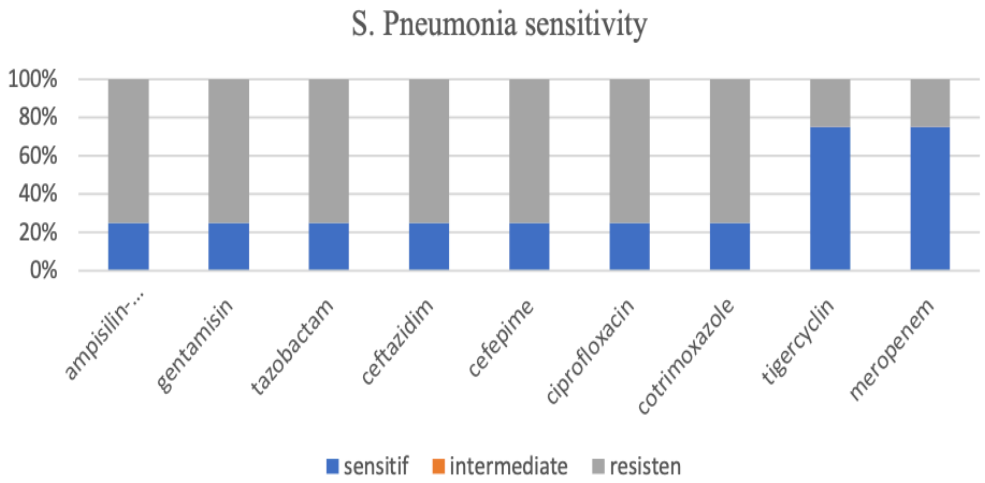

Figure 3: *S. Pneumonia* sensitivity results

Table 6: Antibiotic sensitivity test from *Acetinobacter Baumannii* (n=4)

Sr. No.	Antibiotic name	Sensitive	Intermediate	Resistant
1	Ampicillin sulbactam	25%	20%	60%
2	Cefotixin screen	-	-	100%
3	Ceftriaxone	-	-	80%
4	Gentamicin	25%	20%	60%
5	Amoxicillin-clavulanic	-	20%	80%
6	Tazobactam	25%	20%	20%
7	Cephalothin	-	-	100%
8	Cefazolin	-	-	100%
9	Cefuroxime	-	20%	60%
10	Cefoperazone	-	-	80%
11	Cefotaxime	-	-	80%
12	Ceftazidime	25%	-	80%
13	Cefepime	25%	-	80%
14	Ciprofloxacin	25%	-	100%
15	Levofloxacin	-	-	100%
16	Moxifloxacin	-	-	100%
17	Azithreonam	25%	-	80%
18	Tigercycline	75%	-	20%
19	Vancomycin	-	-	100%
20	Clindamycin	-	-	100%
21	Erythromycin	-	-	100%
22	Meropenem	75%	-	20%

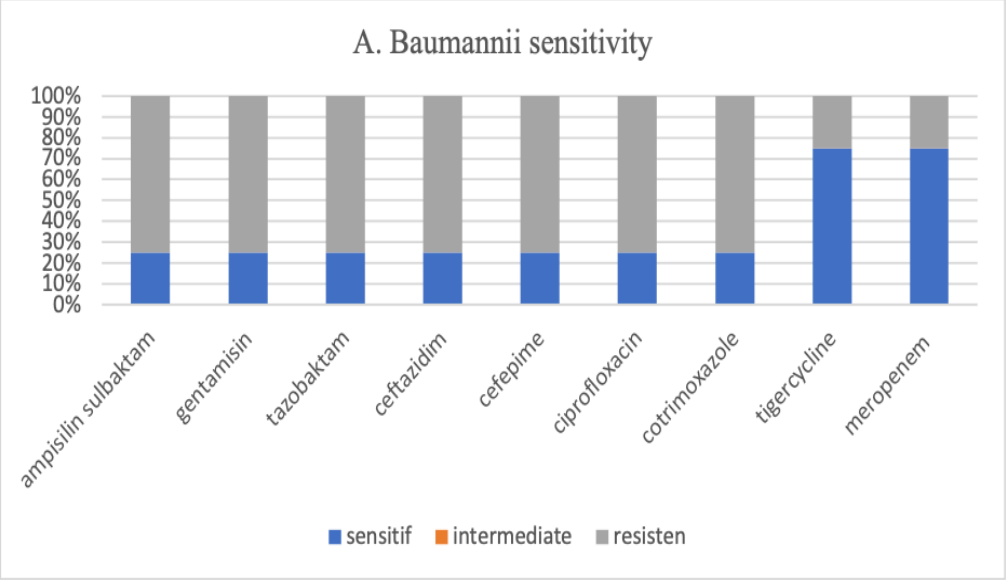

Figure 4: Sensitivity Results of A. Baumannii

Antibiotic sensitivity test results used in *Acetinobacter* culture *Baumannii* obtained that 75% of cultures (3 of 4 cultures) were sensitive to tigecycline and meropenem.

Discussion

Necrotizing fasciitis is an aggressive infection that influences superficial fascia and damages the overlying tissue. Infection usually happens in the fascia of the body and extremities, however, this condition can happen in the maxillofacial area. This infection usually occurs in patients who have chronic disease, such as in patients with diabetes mellitus or patients with blood vessel disease. The infectious process can spread quickly, cause an infection of the fascia, perifacial fields and worsen into secondary infection to skin, soft tissue, and the muscles above and below it. Microbiology pattern infection of necrotizing fasciitis varies and usually happens with polymicrobial. Aerobes and anaerobes bacteria are generally found in microbiology tests. At three patients with cervical necrotizing fasciitis that have been treated, all own polymicrobial infection with multi-resistant organisms.[34.41]

This disease is a direct consequence of bacterial infection caused by skin integrity damage in about 80% of cases. Gram-positive cocci specifically strains *of Staphylococcus aureus* and *Streptococci,* are responsible as the common source of the infection. Polymicrobial infection also occurs because gram-negative and anaerobic combination involvement.[41] In this study, 10 out of 28 samples that experienced cervical necrotizing fasciitis were found to have polymicrobes involvement, and gram-negative bacteria tend to dominate.

Necrotizing fasciitis influences about 0.4 of every 100,000 people per year in the United States. In a few regions of the world, this disease generally happens to one in every 100,000 people. Necrotizing fasciitis is a life-threatening disorder with a high number of deaths. Lateness in diagnosis or treatment usually produces bad results.[41] Morbidity and mortality in necrotizing fasciitis usual happen because of septic shock, intravascular disseminated coagulation disease, and organ failure.[32] Early diagnosis of necrotizing fasciitis is very important for possible earlier treatment in a way aggressive for the best result for the patient. Frequent misdiagnoses happen because signs and symptoms at the beginning are not clear and symptomatic appear similar to cellulitis and other infections. Along development of necrotizing fasciitis, the

patient become in a way systemic no longer healthy and showing signs of shock.[34]

About 30% of infection incidents in the United States originate from hospitals (nosocomial infection*)*. Gram-negative bacteria that are the common cause of infection are *P. aeruginosa*, *Acinetobacter baumanni, Enterobacteria* producers of ESBL (Extended Spectrum Beta Lactamase*)* or carbapenemase, and *Escherichia coli.* In Indonesia, Gram-negative bacteria that are the common reason for hospital-related infection tend to be resistant to antibiotics used.[6] On this study, this obtained that the most common bacteria in patients with cervical necrotizing fasciitis is *Pseudomonas Aeruginosa, Klebsiella pneumonia, Acetinobacter baumannii* which part of gram negative bacteria group.

The other frequent bacteria pathogens that cause a higher nosocomial infection incident

is *Staphylococcus aureus.* Pathogens that can cause disease in a way related area with toxic shock syndrome as a consequence from poisoning food, endocarditis , pneumonia, osteomyelitis, sepsis, arthritis, and encephalitis.[7] *S. aureus* is responsible for over 80% of suppurative diseases, with surface skin as its natural habitat until we found some antibiotics to cure the current infectional disease, so it can prevent death and improve continuity of human life.[8]

The common usage of antibiotics happens at the hospital, however, not all have a program for supervision of resistant germs, control of infection, keeping an eye out for the use of antibiotics at the hospital, make making new guidelines in a way sustainable For the usage antibiotics and prophylaxis as well as monitor pattern resistance with record resistance test laboratory data so that can be used For now antibiotic still Potent, safe and effective as well as produce outer good clinic.[9] A House Sick take notes pattern sensitivity with view sensitivity test laboratory data so can used as guidelines use of antibiotics.[4] This thing aims to use antibiotics regularly with rational and correct targets, also for minimize happen resistance antibiotics because of irrational use.

In Indonesia an antibiotic therapy administered to bacterial infection disease usually done based on empirical experience in the past or on recommendations journal from overseas. This matter No can justified remembering bacterial pattern and its resistance pattern to antibiotics different between one area with other regions and also different from time to time. Irrational antibiotic usage can trigger bacterial resistance.[10]

A number of germs resistant antibiotics Already Lots found all over the world, viz *Methicillin-Resistant Staphylococcus Aureus* (MRSA), *Vancomycin-Resistant Enterococci* (VRE), *Penicillin-Resistant Pneumococci, Klebsiella pneumoniae* which produces *Extended- Spectrum Beta Lactamase* (ESBL), *Carbapenem-Resistant Acinetobacter baumannii*.[25.30] Resistant germs antibiotics the happen consequence use antibiotics are not wisdom and

application vigilance standards (standard *precautions)* which are not right at the facility service health. Research result *Antimicrobial Resistance in Indonesia* (AMRIN-Study) is proven of 2494 individuals in the community, 43% *were Escherichia coli* resistant to various type antibiotics including: ampicillin (34%), co-trimoxazole (29%) and chloramphenicol (25%).

The results of the study were 781 patients treated at hospital found 81% *Escherichia coli* resistant to various type antibiotics, i.e. ampicillin (73%), co-trimoxazole (56%), chloramphenicol (43%), ciprofloxacin (22%), and gentamicin (18%). In 2017, WHO issued a list of very bacteria need antibiotics new consequence level high resistance, among others that is *Pseudomonas aeruginosa, Acinetobacter baumannii,* as well as *Klebsiella pneumoniae.* From the results of sensitivity and resistance tests antibiotics used in patients with cervical

necrotizing fasciitis with third culture results microbes the still got antibiotics own good sensitivity is tigercycline and meropenem.

Sensitivity test results This in accordance with research conducted by Mamdouh in 2022 in Egypt shows that sepsis is caused by *Acetinobacter baumannii* and *Klebsiella pneumonia* own good sensitivity to the antibiotic tigercycline.[35] Similar results also with study Mouloudi in a 3-year-old child with *Carbapenem-Resistant Klebsiella Pneumoniae* (CRKP) that Tigecycline can give and can lower number deaths in the ICU were 30%. [38] The effectiveness of tigecyclines is proven in report case to treatment of pneumonia caused various organism including *Mycobacterium chelonae, multidrug-resistant Stenotrophomonas maltophilia,* and *carbapenemase -producing K. pneumoniae.* Tigecycline also shows strong in vitro activity to Lots Gram- negative organisms, except *Proteus* and *Pseudomonas spp*. In A study intercontinental involving more of 26,000 isolates, many Gram- negative organisms show more of 95% vulnerability to tigecycline. This including *Escherichia coli (E. coli), Enterobacter spp,* and *Klebsiella spp*. Other frequent Gram- negative organisms prone to

against tigecycline incl *Serratia spp*, *Stenotrophomonas maltophilia*, and *Acinetobacter spp*. [40]This matter in line with results study that the antibiotic tigecycline is sensitive to bacteria *Pseudomonas Aeruginosa* (66.7%), *Klebsiella Pneumonia* (80%), *S Pneumonia* (100%), and *Acetinobacter Baumannii* (75%).

Tigercyclin This is drug first class antibiotic glycycycline which has similar structure with minocycline however modification existing structure cause enhancement spectrum activity and having more vulnerability low to antibiotic resistance compared group tetracycline. Tigercyclin This own spectrum for oppose gram negative bacteria or good gram negative.[36] Tigecycline works with binds ribosomal subunits 30 S bacteria, so hinder protein synthesis. Resulting activity is bacteriostatic in some big organism with time certain, but it can also be nature bactericidal on isolates *S. pneumoniae* and *L. pneumophilia.[36]*

common cultural findings found in patients with cervical *necrotizing fasciitis* is *Pseudomonas aeruginosa.* On research This obtained *Pseudomonas Aeruginosa* own good sensitivity against meropenem was around 83.4%. Antibiotics beta lactam is known own antipseudomonal properties which constitute component main in governance infection *Pseudomonas aeruginosa.* Studies conducted Anggraini in 2018 in Padang This showing that use group beta lactam like amikacin (76.9%), piperacillin / tazobactam (57.2%), meropenem (57.0%), gentamicin (54.5%), cefepime (53.7%), ceftazidime (49.6%), ciprofloxacin (48.8%) and aztreonam (35.5%) in cases infection *pseudomonas aeruginosa* has high sensitivity. Sensitivity *P. aeruginosa* with other antibiotics very low that is not enough from 10%.[37]

In study This obtained results sensitivity *Klebsiella pneumoniae* against meropenem by 80%. This matter in line with research conducted Muztika etc. in 2020 that sensitivity *Klebsiella pneumoniae* against meropenem was at 96.4 %. *Klebsiella pneumoniae* and *Eschericia coli* producing ESBL (Extended *spectrum beta lactamase)* prevalence is 70.9% and 75.7% respectively sensitivity against meropenem at 96.4 % and 98.8% respectively.[39]

Meropenem is class of ultra-broad-spectrum antibiotics indicated carbapenems For Gram positive, Gram negative and anaerobic bacteria. Based on research at RSUP DR M. Djamil Padang for the period 1 January 2012 – 31 December 2012 found meropenem sensitivity to bacteria reason the most common form of neonatal sepsis is *Klebsiella sp* amounting to 80.8%.[42] In Evita's research at Adam Malik Hospital in 2014, *Acinetobacter baumannii* is a type of

Acinetobacter spp that often cause infection nosocomial. Sensitivity test results *A. baumannii* to ampicillin sulbactam, imipenem, tobramycin meropenem, rimethoprim / sulfamethoxazole Still in limit tolerance. Ampicillin-sulbactam or carbapenems (imipenem or meropenem) are sufficient for treatment infections caused by susceptible strains of *Acinetobacter spp* to antibiotics.[43] This matter in line with study This that in *necrotizing fasciitis* sensitive antibiotic meropenem to bacteria *Klebsiella Pneumonia* (80 %), *Acetinobacter Baumannii* (75 %), and *Pseudomonas Aeruginosa* (83.4%).

A report case by Lindsay in 2019 is mentioned that *Acetinobacter Baumannii* is one of the gram-negative pathogens that can causes fasciitis necroticans. *Acetinobacter Baumannii* is one of Frequent microbes nature resistant to various type antibiotics so that often done therapy. *Acetinobacter Baumannii* often infect characteristic host immunocompromised so that Lots found with polymicrobial conditions.[44] On report case This obtained that sensitivity antibiotics happened *Acetinobacter Baumannii* best found in antibiotics collistin (90%), and meropenem (64%). Studies This showing similar thing that sensitivity to the antibiotic meropenem ranges from 75%.

In several literatures it is found that infection *Streptococcus Pneumonia* is one of them rare microbes become reason the occurrence of fasciitis necroticans, even in from 2001 to 2016 only obtained about 17 reports case of fasciitis necrotiicans with *Streptococcus Pneumonia* culture results. On studies even this samples found in patients with *Streptococcus Pneumonia* culture results are almost everything nature polymicrobial.[45]

On a a study conducted by Larsson in 2021 found exists enhancement resistance to bacteria Streptococcus *Pneumonia* in 2014 compared to 1999. On study This obtained as many as 80% of cases infection *Streptococcus Pneumonia* occurs multiresistant antibiotics compared to 60% in 2007 and 35% in 1997. In the study This It was found that 221 samples were 5% sensitive to cotrimoxazole, 8% sensitive to erythromycin, 12% sensitive to ciprofloxacin, 49% sensitive to tetracycline, 99% to vancomycin and meropenem.[45] results on study This showing almost result similar with Larsson's research shows number sensitivity to *Streptococcus Pneumonia* is higher on the use of meropenem and also tigercyclin .

Conclusions

In patients with cervical *necrotizing fasciitis*, 10 of 28 cases among them are polymicrobial and acquired gram negative group bacteria is group with most culture results, such as *Pseudomonas Aeruginosa, Klebsiella Pneumonia,* and *Acetinobacter Baumannii.*

This study also found resistant pattern to some used antibiotics, however, based on sensitivity test results obtained tigercyclin and meropenem have the best sensitivity

References

1. Jawetz, Melinick, Aldeberg. *Medical Microbiology* . Vol 23. Issue 23. (BMF Medicine, Airlangga University, ed.). Jakarta: Salemba Medika Publishers; 2001.
2. Dwiprahasto I. Policies to Minimize the Risk of Resistance. *Jmpk*. 2005;08 (04):177– 181.
3. Wahyudhi A, Triratna S. Germ Patterns and Antibiotic Susceptibility Testing in Children's Intensive Care Unit Patients at RSMH Palembang. *Sari Pediatr*. 2016;12(1):1. doi:10.14238/sp12.1.2010.1-5
4. Maksum R, Nurgani A, Endang P, et al. Antibiotics with sensitivity testing in the intensive care unit at Fatmawati Hospital, Jakarta, 2001 – 2002. 2004;8 (1):21–26.
5. Soleha TU. Antibiotic Sensitivity Test. *Juke Unila* . 2015;5(9):121.
6. Indrayudha P. Germ Patterns and Resistance to Antibiotics from Pussy Specimens at Dr. Hospital. Moewardi 2012. *Pharmacon J Farm Indonesia*.

2012;13(2):70–76. doi:10.23917/pharmacon.v13i2.13
7. Tseng CW, Zhang S, Stewart GC. Accessory Gene Regulator Control of Staphylococcal Enterotoxin D Gene Expression. *J Bacteriol*. 2004;186 (6):1793–1801. doi:10.1128/JB.186.6.1793-1801.2004
8. Nickerson EK, West TE, Day NP, Peacock SJ. Staphylococcus aureus disease and drug resistance in resource-limited countries in south and east Asia. *Lancet Infect Dis*. 2009;9(2):130–135. doi:10.1016/S1473-3099(09)70022-2
9. Refdanita, Maksum R, Nurgani A, Endang P. Patterns of Germ Sensitivity to Antibiotics in the Intensive Care Room at Fatmawati Hospital, Jakarta, 2001 – 2002. *Makara Kesehatan*. 2004;8 (2):41–48.
10. Karina, Angraini Dewi ON. Resistance Pattern of Coagulase Negative Staphylococcus to Antibiotics Isolated from Blood Cultures of Neonates Suspected of Sepsis in the Neonatal Care Installation of Arifin Achmad Hospital, Riau Province, Period 01 January- 31 December 2014. *Let's FK* . 2015;2(2):1–9. http://www.elsevier.com/locate/scp.
11. Sette-Dias AC, Maldonado AJ, Aguiar EG de, Roque de Carvalho MA, Magalhães PP. Profile of patients hospitalized with odontogenic infections in a public hospital in Belo Horizonte, Brazil. 2012.
12. Bascones-Martínez A, Muñoz-Corcuera M, Meurman JH. Odontogenic infections in the etiology of infective endocarditis. *Cardiovasc Haematol Disord Targets (Formerly Curr Drug Targets-Cardiovascular Hematol Disord* . 2009;9(4):231–235.
13. Xuedong Z. *Dental Caries: Principles and Management*. Springer; 2015.
14. Carranza F, Newman M, Takei H, Klokkevold P. Carranza's clinical periodontology 10th ed. *Philadelphia: Linda Duncon* . 2006:86–88.
15. Peterson LJ, Ellis E, Hupp JR, Tucker MR. *Contemporary oral and maxillofacial surgery*. Mosby St. Louis; 1998.
16. Moloney J, Stassen LF. Pericoronitis: treatment and a clinical dilemma. *J Ir Dent Assoc*. 2009;55(4):190–192.
17. Ho CCK, Tang T. Failing implants, maintenance, recall. *Australas Dent Pract* . 2011:138–146.
18. Andreasen JO, Bakland LK. Pulp regeneration after non-infected and infected necrosis, what type of tissue do we want? A review. *Dent Traumatol*. 2012;28(1):13–18.
19. Malik NA. Textbook of oral and maxillofacial surgery 3rd edition. *Jaypee: New Delhi* . 2012:635–637.
20. Zamiri B, Hashemi SB, Hashemi SH, Rafiee Z, Ehsani S. Prevalence of odontogenic deep head and neck spaces infection and its correlation with length of hospital stay. 2012.
21. Kradin RL. *Diagnostic Pathology of Infectious Diseases E-Book*. Elsevier Health Sciences; 2017.
22. Balaji SM, Balaji PP. *Textbook of Oral & Maxillofacial Surgery-E Book*. Elsevier Health Sciences; 2018.
23. Sánchez R, Mirada E, Arias J, Paño Pardo JR, Burgueño García M. Severe odontogenic infections: epidemiological, microbiological and therapeutic factors. 2011.
24. Fragiskos FD. *Oral surgery*. Springer Science & Business Media; 2007.
25. Handayani RS, Siahaan S, Herman MJ. Antimicrobial Resistance and Implementation of Control Policies in Hospitals in Indonesia. *J Researcher and Health Service Developer*. 2017;1(2):131–140.http://ejournal.litbang.kemkes.go.id/idex.php/jpppk/artcle/view/8101.
26. Fuhrmann J. Antibiotic resistance: a challenge for the 21st century. *Soc Gen Microbiol* . 2015:1–11.
27. Garima Kapoor, Saurabh Saigal AE. Action and resistance mechanisms of antibiotics: A guide for clinicians: Review Article. *J Anaesthesiol Clin*

Pharmacol. 2017;33(3):300– 305. doi:10.4103/joacp.JOACP
28. A. Dowling, J. O' Dwyer CCA. Antibiotics: mode of action and mechanisms of resistance. *Antimicrob Res Nov bioknowledge Educ programs (A Méndez-Vilas, Ed)*. 2017:536–545. doi:10.7748/ns.25.42.49.s52
29. Goswami NN, Trivedi HR, Goswami APP, Patel TK, Tripathi CB. Antibiotic sensitivity profile of bacterial pathogens in postoperative wound infections at a tertiary care hospital in Gujarat, India. *J Pharmacol Pharmacother* . 2011;2(3):158–164. doi:10.4103/0976-500X.83279
30. Leekha S, Terrell CL, Edson RS. General principles of antimicrobial therapy. *Mayo Clinic Proc*. 2011;86(2):156–167. doi:10.4065/mcp.2010.0639
31. Kang SH, Kim MK. Antibiotic sensitivity and resistance of bacteria from odontogenic maxillofacial abscesses. *J Korean Assoc Oral Maxillofac Surg*. 2019;45(6):324–331. doi:10.5125/jkaoms.2019.45.6.324
32. Nugroho, SS, Syamsudin, E., Hardianto, A., & Riawan, L. (2017). Surgical Management of Necrotizing Fasciitis Due to Odontogenic Infection with Sepsis: Case Report. *J. Dent. Health Oral Disord. Ther* , *6* (2), 00190.
33. Egas, LS, de Carvalho Reis, ENR, da Silva, LF, Bonardi, JP, de Lima, VN, Ferreira, PHSG, ... & Júnior, IRG (2018). Cervicofacial necrotizing fasciitis and drugs. *Journal of Craniofacial Surgery* , *29* (6), e617-e618.
34. Bayetto, K., Cheng, A., & Sambrook, P. (2017). Necrotizing fasciitis as a complication of odontogenic infection: a review of management and case series. *Australian Dental Journal*, *62* (3), 317-322.
35. Gaafar, M.. Multidrug Resistant Acinetobacter Species Infection among Neonatal Sepsis. *The Egyptian Journal of Hospital Medicine*, *86* (1), 541-547. 2022.
36. Greer ND. Tigecycline (Tygacil): the first in the glycylcycline class of antibiotics. Proc (Bayl Med Cent Univ). 2006 Apr;19(2):155-61.
37. Anggraini , D.. et al. Prevalence and patterns sensitivity antimicrobial multidrug resistant Pseudomonas aeruginosa at Arifin Achmad Regional Hospital. *Magazine Bandung Medicine*, *50* (1), 6-12. 2018
38. Mouloudi , E, et al. Tigecycline for treatment of carbapenem-resistant Klebsiella pneumoniae infections after liver transplantation in the intensive care unit: a 3-year study.
39. Muztika , SA, et al. Prevalence and Sensitivity Patterns Klebsiella pneumonia and Escheicia antibiotics chilli Producing Extended Spectrum Beta Lactamase at RSUP Dr. M Djamil Padang. *Journal Health Andalas* . 2020. Vol9(2)
40. Townsend, M.L., et all. Potential role of tigecycline in the treatment of community- acquired bacterial pneumonia. *Infect Drug Resist* . 2011; 4: 77–86
41. Heather A. Wallace; Thomas B. Perera . Necrotizing Fasciitis. *StatPearls* .2023
42. Putri, SI, et all. Sensitivity Bacteria Causes of Neonatal Sepsis against Meropenem in the Neonatal Intensive Care Unit and Perinatology at DR M Djamil Hospital Padang Padang 2012. *Health Journal Andalas* . 2014; 3(3)
43. Evita Mayasari et all. Prevalence of Acinetobacter Baumannii Isolated from Clinical Specimens. *MKA*, Volume 37(1).2014
44. Lindsey, et al. The brief case: A fatal case of necrotizing fasciitis due to multidrug- resistant Acinetobacter baumannii . 2019
45. Larsson, et al. Multi-drug resistance in Streptococcus pneumoniae among children in rural Vietnam more than doubled from 1999 to 2014. *Acta Paediatrica* , 2021, 110.6: 1916-1923.